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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/643,115

08/18/2003

Jiann-Jong Wang

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03/21/2005

QUINTERO LAW OFFICE
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EXAMINER

NGUYEN, DILINH P

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 03/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

10/643,115

Applicant(s)

WANG ET AL.

Examiner

DiLinh Nguyen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claim 21 is objected to because of the following informalities:

Line 4, claim 21, replace "a interval layer" with --the interval layer--.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

2. Claim 21 is rejected under 35 U.S.C. 102(e) as being anticipated by Applicant Admitted Prior Art (AAPA).

AAPA (figs. 1B-2E) disclose a method for forming a trench, comprising:

providing a substrate 10, further comprising a trench DT;

forming a conductive layer 18 in a portion of the trench;

forming an interval layer 22 or 34 (fig. 2C) in a portion of the trench, wherein the interval layer is over the conductive layer 18;

forming a protective layer 36 on the sidewall of the trench over the interval layer 34 (or portion of the layer 36 over the interval layer 22) (fig. 2D);

removing the interval layer 22 (fig. 2D) or removing the interval layer 34 (fig. 2E), exposing the sidewall of the trench over the conductive layer (fig. 2E); and

oxidizing the trench sidewall (page 3, lines 27-30), wherein the top portion of the trench is protective by the protective layer 36 from oxidizing.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of JaiPrakash et al. (U.S. Pat. 6605504).

AAPA disclose a method for forming a trench, comprising:
providing a substrate 10, having a trench DT formed therein;
forming a conductive layer 18 in a portion of the trench;
forming an interval layer 22 in a portion of the trench, which the interval layer in over the conductive layer;
removing the interval layer (fig. 2D), exposing the underlying sidewall of the trench (fig. 2E); and
oxidizing the trench sidewall (page 3, lines 27-30) and the exposed sidewall of the trench.

AAPA fails to disclose forming a sacrificial layer.

However, JaiPrakash et al. disclose forming a sacrificial layer 156 (including the layers 150, 140 and 154) on the sidewall of the trench over the interval layer 116 (cover fig., column 7, lines 45-50). Therefore, it would have been obvious to one having

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ordinary skill in the time of the invention was made to modify the process step of AAPA by forming the sacrificial layer on the sidewall of the trench, as taught by JaiPrakash et al., in order to provide a buried strap with reduced horizontal out-diffusion thereby increasing memory capacity (column 3, lines 43-48).

- Regarding claim 2, it would have been obvious wherein the substrate is a single crystal silicon substrate.
- Regarding claim 3, AAPA discloses that the step of forming the conductive layer 18 further comprises depositing the conductive layer over the substrate and in the trench and etching back the conductive layer, which in the top of the recessed conductive layer is below the surface of the substrate (fig. 2A).
- Regarding claim 4, AAPA discloses the conductive layer 18 is formed of polysilicon (fig. 2A, page 3, lines 8-9).
- Regarding claim 5, AAPA discloses the trench (DT) comprises a capacitor (page 2, lines 3).
- Regarding claim 6, AAPA disclose the interval layer 22 and it would be obvious that the interval layer is formed of TEOS (fig. 2D).
- Regarding claim 7, AAPA disclose the steps of forming the interval layer 22 further comprises depositing the interval layer on the substrate and in the trench and etching back the interval layer, which in the top of the interval layer is below the surface of the substrate (fig. 2D).
- Regarding claim 8, JaiPrakash et al. disclose forming the sacrificial layer 140 further comprises conformally depositing the sacrificial layer on the interval layer

and etching back the sacrificial layer to form the sacrificial layer on the sidewall of the trench over the interval layer (column 7, lines 19-33).

- Regarding claim 9, JaiPrakash et al. disclose that the sacrificial layer 140 is formed of polysilicon (column 6, line 13).
- Regarding claim 10, it would have been obvious to form the depth of the trench between 5000nm-9000nm. Moreover, the depth of the trench would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Furthermore, the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. See *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed, Cir. 1990).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DLN



HOAI PHAM
PRIMARY EXAMINER